

Title: Evaluation of native and adapted plants for landscape use

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PLANT INDUSTRIES

Abstract

The objective of this research is to acquire, evaluate, and release native plant materials, particularly new varieties of trees, shrubs, perennials, and ornamental grasses, for use in water-conserving home landscapes. In 2009, species collection activities were curtailed and more effort was put into evaluation activities and preparations for plant marketing. Intensive evaluations and observations were completed, superior plants identified and inferior plants eliminated. Seed was collected from superior plants in preparation for introduction into seed increase blocks or for additional cycles of selection. External evaluation activities to identify superior native plant accessions continued and expanded in demonstration gardens at public schools and evaluation plots at public botanic gardens and arboreta. Exploration of marketing avenues and strategies for native plant selections was continued.

Objectives

This project was guided by two major objectives:

- 1) Identify native and adapted perennial, shrub, and tree species for use in traditional and water-conserving landscapes through collection and evaluation activities.
- 2) Develop and release new landscape-worthy plant cultivars for use by the Idaho nursery industry.

The ultimate goal is to develop unique plant materials that will attract new consumers and help make local landscape nurseries more competitive and profitable, especially, but not limited to, nurseries specializing in the production and sale of native plants. This report specifically summarizes the fourth year of research accomplishments on this project but also includes overall research progress over the four years it has been in existence.

Accomplishments

Summary of 2009 Activities

Established plants were evaluated for horticultural value. Accessions or plants within accessions were eliminated if they showed excessive winter injury, weakened growth due to lack of adaptation to soil or climate, poor flowering characteristics, unsightly appearance, or any other inferior horticultural trait. Superior accessions were retained in the plots and seed collected from the best plants within each accession for the purpose of initiating a second cycle of selection and to provide propagation material for establishing seed increase blocks. Seedlings of superior plants were distributed statewide to botanic gardens and other cooperators for outside evaluation. Seed increase blocks were established for the most advanced and promising plant selections

Details of 2009 Activities

Evaluation of Native Plant Accessions:

Methods:

Extensive evaluations were continued on 3 acres of plant materials established 2006 to 2009. These plots had survived one to three winter seasons, providing opportunity for



Buckwheat species in the evaluation plots
at the Aberdeen R & E Center

observations on hardiness, adaptation, mature appearance, flowering period, and horticultural value. Two difficult environmental factors were imposed on these plants. First, they were planted in a moderately heavy silt-loam soil with a high pH (8.2). Also, these established plots were irrigated with only 25 to 30% of the amount of water (based on evapotranspiration) typically used to maintain a bluegrass lawn in SE Idaho. On average, seven inches of supplemental (above natural precipitation) water was applied to the plots over the period June to September. These conditions provided opportunity for selecting plants that can thrive in southern Idaho water-conserving gardens.

Results

Over 500 species of native plants were evaluated in plots at the Aberdeen R & E Center in 2009. This included

wildflowers, shrubs, and trees. By far the majority of these species have horticultural value, with some showing outstanding potential for use as landscape specimens.

Table 1 lists some of the superior accessions that have shown good hardiness, acceptable adaptation, and potential for use in both water-conserving and traditional landscapes. This is only a partial list of a larger number of superior plants.

Table 1. Native plant species expressing exceptional horticultural value in trials at the Aberdeen R & E Center.

Species	Description
Trees	
<i>Acer grandidentatum</i> Bigtooth Maple	A small tree that eventually grows to 25 feet. Can be grown as clump or single trunk. Great fall red color.
Shrubs	
<i>Amelanchier alnifolia</i> Serviceberry	Dwarf selection 30" tall, abundant white spring flowers and summer purple fruit. Bright yellow fall color.
<i>Rhus trilobata</i> Oak-leaf Sumac	8' tall, dark green shiny leaves that turn bright red in the fall, bright red berries in late summer.
<i>Philadelphus lewisii</i> Syringa	10' tall, medium green leaves, large white flowers in spring that produce a pleasant fragrance.
Grasses	
<i>Sporobolus airoides</i> Alkali Sacaton	30" tall, light medium green basal leaves, flower panicles are feathery and attractive through summer.
<i>Sporobolus wrightii</i> Giant Sacaton	7' tall, attractive light green leaves, large feathery seed heads that provide nice winter interest.
<i>Poa secunda</i> Big Bluegrass	20" tall, flowers early and remains attractive through the summer, very drought tolerant.
<i>Deschampsia caespitosa</i> Tufted-hair Grass	Height variable, many different forms, gold-colored panicles glisten in the sunlight.
Perennial Wildflowers	
<i>Geranium caespitosum</i> Fremont's geranium	18" tall, large dark green leaves turn red in fall, light purple flowers w/ dark veins. Blooms May-September.
<i>Stanleya pinnata</i> Prince's Plume	30" tall, sparse gray leaves, tall yellow flower candles, blooms June-September. Very drought tolerant.
<i>Gaillardia aristata</i> Blanketflower	24" tall, hairy light green leaves, large yellow to red sunflowers bloom for most of the summer.
<i>Hymenoxys acaulis</i> Sundancer Daisy	8" tall, silver to silver-green mat leaves, bright yellow 2" flowers, blooms all summer. Very drought tolerant.
<i>Papaver radiculatum</i> Rooted Poppy	18" tall, mounded light green fuzzy leaves, bright orange flowers over extended period June-September.
<i>Penstemon subglaber</i> Smooth Penstemon	30" tall, very upright habit, leafy stems, very dark blue flowers May-July. Remarkable flower color.

<i>Penstemon labrosus</i> Scarlet Penstemon	40" tall, basal leaves and tall wands, bright orange-yellow flowers, blooms July-September.
<i>Penstemon linarioides</i> Toadflax Penstemon	12" tall, compact growth, narrow blue-green leaves, short spikes of soft blue flowers June-August.
<i>Penstemon venustus</i> Venus Penstemon	24" tall, attractive toothed foliage, masses of pink-purple flowers in May-July.
<i>Penstemon petiolatus</i> Sheep Range Beardtongue	8" tall, very compact, blue-green leaves, bright pink flowers, blooms May-August.
<i>Penstemon ambiguus</i> Bush penstemon	20" tall, an unusual penstemon with bush-type growth, covered with flat pink phlox-like flowers
<i>Penstemon ovatus</i> Egg-leaf Penstemon	18" tall, dense dark green leaves, leafy spikes, bright blue flowers. Blooms first year and from May-August.
<i>Penstemon cardinalis</i> Cardinal Penstemon	30" tall, large healthy leaves and tall flower spikes, dark red flowers, blooms June-July.
<i>Penstemon glabrescens</i> Crandall's Beardtongue	6" tall, forms a dense mat that is wider than tall, light blue flowers off and on all summer.
<i>Penstemon rostriflorus</i> Bridge's Penstemon	30" tall, red flowers over a long period in mid-summer to early fall.
<i>Penstemon sepalulus</i> Littlecup Penstemon	24" tall, shrubby form, small gray leaves, numerous flower stalks, light violet flowers in June-July.
<i>Penstemon platyphyllus</i> Broadleaf Penstemon	24" tall, shrubby form, numerous flower stalks, light violet or pinkish-purple flowers in June-July.
<i>Penstemon davidsonii</i> Davidson's Penstemon	12" tall, woody stems and evergreen leaves, huge purple flowers in May-June.
<i>Penstemon whippleanus</i> Whipple's Penstemon	18" tall, mat foliage and large green leaves, flowers are dark purple to almost black, early bloom in April-May.
<i>Penstemon confertus</i> Yellow Penstemon	12" tall, dark green mat leaves, upright flower stalks produce numerous light yellow flowers in May-June.
<i>Penstemon pseudospectabilis</i> Desert penstemon	30" tall, shrubby form, dark pink flowers. Very long bloom period, May-October.
<i>Clematis fruticosa</i> Mongolian Gold Clematis	18" tall, shrub form of clematis with nodding dark yellow flowers (adapted but not native).
<i>Clematis integrifolia</i> Solitary Clematis	12" tall, shrub form of clematis with star-shaped dark blue flowers (adapted but not native).
<i>Eriogonum caespitosum</i> Mat Buckwheat	4" tall, very compact growth, attractive silver-gray leaves, yellow to red flowers May-June.
<i>Eriogonum heracleoides</i> Wyeth's Buckwheat	18" tall, white to buff flowers over dark green foliage, competitive with companion plants.
<i>Eriogonum jamesii</i> Jame's Buckwheat	12" tall, white or yellow flowers in late summer, leaves may turn purple in fall.
<i>Eriogonum brevicaulis</i> Shortstem Buckwheat	8" tall, a mat-type buckwheat with dark green leaves and bright yellow flowers. Blooms all summer.
<i>Eriogonum wrightii</i> Bastardsage	10" tall, spreading mats of gray leaves, airy racemes of light pink flowers.
<i>Eriogonum ovalifolium</i> Oval-leaf Buckwheat	6" tall, round mats of tightly packed silver leaves, pom-pom flowers in many colors from white to dark red.

<i>Eriogonum niveum</i> Snowy Buckwheat	24" tall, silvery mat leaves give rise in August to lacy flower stems and white to pink flowers.
<i>Eriogonum strictum</i> Strict Buckwheat	18" tall, silver mat leaves give rise in late fall to an umbrella of intensely white flowers.
<i>Eriogonum coloradense</i> Colorado Buckwheat	8" tall, dark green mat leaves and white flowers. Blooms all summer
<i>Agastache pallidiflora</i> Bill Williams Mountain Hyssop	24" tall, dark green leaves, dense habit, dark reddish-purple flowers in narrow spikes June-August.
<i>Agastache cana</i> Hummingbird Mint	40" tall, small gray leaves, dark pink flowers from mid-summer to late fall, nice fragrance.
<i>Salvia azurea</i> Blue Sage	40" tall, small green leaves, flowers bright sky blue, blooms late fall.
<i>Agastache occidentalis</i> Western Giant Hyssop	30" tall, large very dark green leaves, dense habit, large spikes of blue-purple flowers June-August.
<i>Aquilegia desertorum</i> Desert Columbine	15" tall, dark green leaves, dark red/yellow flowers. Blooms in early to mid-summer. Drought tolerant.
<i>Aquilegia chrysantha</i> Golden Columbine	24" tall, light green leaves, large yellow flowers borne on long upright stems, long bloom in early summer.
<i>Aquilegia scopulorum</i> Utah Columbine	6" tall, dark blue leaves, beautiful blue and white flowers on short stems.
<i>Aquilegia formosa</i> Western Red Columbine	36" tall, medium green leaves, dark red/yellow flower. Extended bloom May-July.
<i>Yucca nana</i> Dwarf yucca	6" tall, silver leaves with very sharp tips, often curled sharply under. Yet to flower.

Establishment of Seed Increases:

Methods:

In the spring of 2009, the first increase block was established at the Aberdeen R & E Center. In order to qualify for increase, an accession of a species must have shown exceptional horticultural value and be relatively free from visible variability. Seed for the increase blocks was collected from eligible accessions in the fall of 2008. The seed was stratified, planted, and seedlings transplanted to the field in the spring of 2009 in a field separated from the evaluation plots.

Results:

Plants of 33 accessions were successfully established in increase blocks. The plants will be allowed to grow and mature over the next three years. In the interim, off-type or poor-performing plants will be removed. Once mature, seed will be harvested from the plants and used for commercial production. This is the first phase of establishment for long-term increase blocks of superior native plants. The process will continue as long as funding is available and superior plants are forthcoming from the evaluation plots.

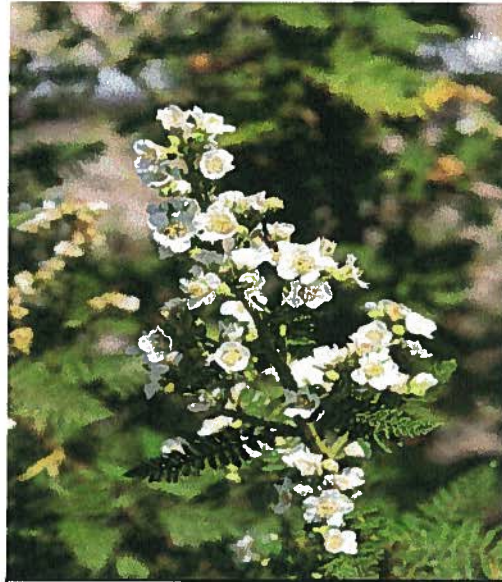
Some of the best of the plants established in the increase blocks include selections from the following species:



Fall flowers of giant purple sage
(*Salvia pachyphylla*)

Giant purple sage (*Salvia pachyphylla*) has been selected for hardiness, compact growth, large flower clusters, and dark blue/purple flower color. This species is arguably the most beautiful flowering shrub in the trials. The plants have evergreen foliage and produce eye-catching flowers from early summer until hard frost.

Desert fernbush (*Chamaebatiaria millefolium*) is another attractive accession. These plants bloomed profusely in their second year of establishment. Some of these plants have dense form and very large flower clusters from which seed was collected for increase purposes.



The drought tolerant desert fernbush (*Chamaebatiaria millefolium*) in bloom



Large flowers of Utah columbine,
Aquilegia scopulorum.

Utah columbine (*Aquilegia scopulorum*) is unusual and very attractive. It produces tiny mounds of blue leaves and large blue and white flowers. It has been selected for flower color, leaf color, compactness, and consistency of

bloom. The result is a very attractive perennial for any bed or border situation.

There is an almost unending number of penstemon accessions with horticultural value. The beardlip penstemon (*Penstemon barbatus*) is a tall (5'), upright plant with dark red flowers. It has a long bloom period and provides color for much of the summer. The plants in the trials have been selected for dark red



Red flowers of beardlip penstemon,
Penstemon barbatus.

flower color, flower profuseness, and long bloom. Compactness has also been considered.

Egg-leaf penstemon (*Penstemon ovatus*) has two unusual characteristics. It can withstand more water than most penstemons and usually flowers during the season of establishment. It produces a leafy plant about 18" tall, followed by small, bright blue flowers. This is a very nice penstemon for most gardens.

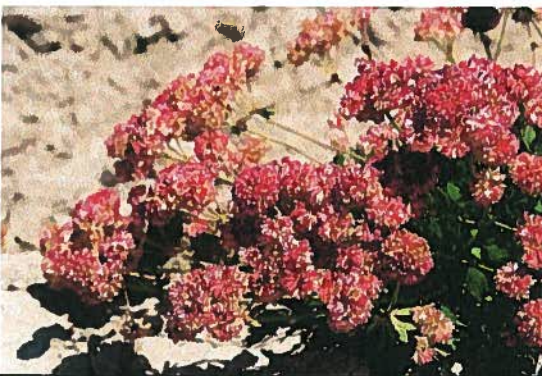
The broad-leaf beardtongue (*Penstemon platyphyllus*) has more of a shrubby appearance than most penstemons. It has a small bluish leaves, highly branched form, and numerous flowering stems. It blooms over a period of about three months. The flowers are very large and dark purple. The plants have been selected for bloom quantity, bloom longevity, and resistance to powdery mildew. This is a nice plant for a perennial bed.



Blue flowers of egg-leaf penstemon (*Penstemon ovatus*)

Some of the many interesting buckwheat species have been established in the seed increase blocks. Douglas buckwheat (*Eriogonum douglasii*) is a diminutive (8" tall) plant with very attractive silver-gray leaves. The foliage has sufficient appeal to stand alone in the garden. The flowers are bright yellow and shaped like small pompoms. The plants bloom in May and June. This species has been selected for hardy attractive foliage and flower production.

Lacy buckwheat (*Eriogonum corymbosum*) could actually be classified as a shrub. It is evergreen and woody. It produces a fascinating wiry plant, followed by fall flowers. The form selected for the increase plots in 2009 has unusual yellow flowers. The more common type has white flowers. This accession has been selected for compactness and uniformity of plant shape. This is a great plant for a dry garden.



Summer red flowers of sulfurflower buckwheat, *Eriogonum umbellatum*

Sulfurflower buckwheat (*Eriogonum umbellatum*) is an incredibly variable species. The form introduced into the 2009 increase plots has very dark reddish-green evergreen leaves and light yellow flowers that slowly change to dark red. The flowers last for almost two months. In the fall, the leaves turn dark reddish-purple. This is a nice form of a plant that has proven its worth in

native plant gardens.

The seaside daisy (*Erigeron glaucus*) is not considered hardy in Zone 4 Idaho. However, we have managed to select fully hardy individuals among the accessions of this beautiful plant. It produces a summer-long display of 2" purple daisies over the top of attractive, dark green, fuzzy foliage. It is one of the best daisies tested to date.



Hardy plants of seaside daisy,
Erigeron glaucus.



A dense compact form of sunset hyssop,
Agastache rupestris.

Sunset hyssop (*Agastache rupestris*) is already in commerce, to a limited degree. We have selected a form that is completely hardy in Aberdeen, has a long bloom period, and is relatively compact. This plant produces fairly tall (3') plants that bloom for an extended season in summer through late fall. The flowers are an interesting combination of purple and pink color. The plants have a very nice minty-spicy fragrance and attract both butterflies and hummingbirds.

Establishment of Public Demonstration and Evaluation Gardens

Cooperative plant evaluation projects were extended in 2009. The Idaho Botanic Garden



New native plant evaluation plot at the
Idaho Botanic Garden.

established two gardens to evaluate and demonstrate the native plants emerging from the selection plots. The Sawtooth Botanic Garden planted additional plants in its evaluation garden. The Extension Office in Shoshone County established an evaluation garden around the county office building. The Holy Rosary School in Idaho Falls continues to maintain its native planting area. The Sorenson Elementary School in Coeur d'Alene failed to complete its native plant garden project.

Correspondence has been initiated with the City of Pocatello regarding establishment of an evaluation garden within city limits.

Planting of New Accessions

Methods

Although collection of new species was limited in 2009, some new plants were established in the evaluation plots. Included were accessions of shrub species from the genera *Ericameria*, *Rhus*, and *Chilopsis*, the tree genera *Acer* and *Celtis*, and the perennial genera *Penstemon*, *Eriogonum*, *Aster*, *Oenothera*, *Geranium*, *Zauschneria*, and *Calylophus*.

In January-February of 2009, seed was mixed with moist potting soil/sand, placed in Ziploc bags, and stratified for approximately two months at 40⁰ F. In March, seed was planted in flats and allowed to germinate in a greenhouse at the Aberdeen R&E Center. When plants were 3-4 weeks old, a maximum of 40 plants from each seed lot were teased out of the flats and planted into individual cells of cone flats. In June, plants were transplanted to the field on the Aberdeen R&E Center. Approximately 1/4 acre of land was required for establishment of 2008 accessions.

Plant establishment practices were designed to mimic nursery handling procedures. The intent was to provide selection pressures that give preference to plants capable of thriving through typical production and transplanting procedures. Detailed notes were maintained on germination and survival during establishment.



Results

Germination in the greenhouse of seed collected in 2008 was generally good.

However, a soil related problem, possibly salt contamination, developed in the greenhouse following transplanting, resulting in significant losses of seedlings. This resulted in the complete loss of some accessions and reduced number of transplants in others.

2009 Plant Collection Activities

Due to progression of the project, plant collection activities were limited in 2009. Given the large number of accessions acquired in the previous four years, the need for new plant materials is limited. Seed of a small number of accessions, with emphasis on choice trees and shrubs, were purchased from native seed companies and professional collectors. These accessions will be established in the field during the spring of 2010.

Development of a Native Plant Marketing System

As native plant selections emerge from the evaluation program it will become imperative to have in place a system for introducing, increasing, and producing a marketable product. There are many aspects to developing such a system. An overarching philosophical principle that determines ultimate procedure is the benefit of the program to the industry. It is the desire of the scientists involved to directly benefit the nursery industry of Idaho. Accomplishing this will require a procedure to systematically move selected plants through a commercialization process.

One of the factors that will determine success in supplying plants to the retail industry will be making plants available through dependable supply chains. Creating adequate supplies of new plants will require involvement of seed producers and nurserymen.

At the same time supply increases, so must demand. Increasing demand will require a comprehensive marketing plan that includes elements of both education and advertising. Working out the details and achieving commitments to make an introduction system viable will be one of the major emphases of this project over the next three years.

Expenditure Report

<u>Category</u>	<u>Amount Allocated</u>	<u>Amount Expended</u>
Salaries, wages and fringe benefits	\$6,600	\$6,600
Travel for marketing activities	\$2,020	\$1,778
Seed, pots, trays, labels, soil mix, etc	\$ 900	\$ 900
Field charges, local motor pool, seed	\$1,400	\$1,400
Total funds allocated	\$10,920	
Total expensed to date		\$10,678
Amount remaining as of 21 Dec 2008	\$ 242	